

CONFIDENTIAL

SERIALS - CURRENT OUTSTANDING MAJOR MECHANICAL PROBLEMS, J410-20 ENGINE 6 DECEMBER 1961

Notes

1. References are listed to indicate approximate chronological history of problem activity since surfacing.
2. The division of problems into categories of reliability, performance, controls and durability for the purpose of orderly presentation obviously leads to some overlap and conflict between categories. For instance, control problems certainly affect reliability and performance.
3. Many detailed problems are excluded.
4. Many problems heretofore resolved or close to resolution are excluded.
5. All additive and airframe ejector not being intimate with the engine are excluded.

SUMMARY - CURR Approved For Release 2002/10/30 : CIA-RDP81B00879R001000070094-5 DECEMBER 1961

Problem	References Spec. No. Date	Present Status	P&M Confidence Relative to 9/11/61	Remarks/Action
A. Reliability:				
1. Hydraulic Pump	ORC-1572 1/12/61 ORC-1726 5/22/61 ORC-1823, 4 6/19/61 ORC-1987 8/2/61 ORC-2040 9/3/61 ORC-2234, 5 9/5/61 ORC-2709 11/24/61	Excessive piston/bore wear still encountered at fuel temperatures above 200°F. Reliability at sea level also questionable.	No change-low	P&M design for alternate centrifugal pump in process
2. Hydraulic System Flow Dynamics	ORC-1726 5/22/61 ORC-2647 11/16/61	Piping ruptures experienced due to severe and rapid pressure fluctuations.	Not Identified on 9/11/61	XD-2 investigating and testing methods of damping.
3. Flushing - Mechanical Fittings	ORC-1823 6/19/61 ORC-1987 8/2/61 ORC-2234, 5 9/5/61 ORC-2709 11/24/61	Initial hardware deliveries now being assembled into FL-114, FL-115.	Decreased	Item 2 coupled with new untested fittings has decreased confidence. To be tested on FL-114.

Problem	Reference Memo No. Date	Present Status	How Confidence Relative to 9/11/61	Remarks/Action
Approved For Release 2002/10/30 : CIA-RDP81B00879R001000070094-5				
5. Take-Off Performance:	OKC-2708,9 OKC-2733	11/24/61 11/30/61		
1. Turbine Profile - Burner Comb	OKC-1972 OKC-2235 OKC-2420	4/17/61 9/1/61 10/10/61	Until very recently this problem reflected a normal continuous development effort to improve temperature profile for 1900° operation. On this basis existing bill of material hardware represented an 1850° capability which reflected a 9 to 10% thrust deficiency entirely within the initial R2 limited engine requirements. During late November exploratory testing triggered by an unexplainable combustion upset experienced earlier on engine FI-113 revealed additional evidence of this upset. Since then further testing has confirmed this and revealed an unacceptable 600°F spread from nominal average turbine inlet temperature.	Changing day to day Primary effort involving up and down. Fluids FI-111, FI-113, IS-1. Testing. A day to day process of gas path configuration change followed by test to isolate by elimination the factor or factors responsible for the upset.
2. Afterburner Performance	OKC-1493 OKC-1496 OKC-1572 OKC-2647 OKC-2702,9	3/24/61 3/27/61 4/17/61 11/16/61 11/24/61	Bill of material four ring sprayer is 5% deficient in augmentation	Not established on 9/11/61 FI-113 currently testing five ring sprayer in effort to improve augmentation.
3. Compressor Matching and Efficiency	OKC-1972 OKC-1823,4 OKC-1987 OKC-2040 OKC-2235 OKC-2709	4/17/61 6/19/61 8/2/61 8/3/61 9/1/61 11/24/61	Current deficiency during bleeds closed operation is due to 3.5% airflow deficiency and 2 1/2% compressor efficiency deficiency.	Not defined on 9/11/61 Problem deep rooted in existing rotor hardware geometry. Probably requires downstream retrofit for correction.
4. Thrust Balance and Turbine Cooling Airflow	OKC-1987 OKC-2235 OKC-2709	8/2/61 9/1/61 11/24/61	Compressor air bleed for number two bearing thrust balance and turbine cooling is greater than originally anticipated resulting in an estimated 3% performance deficiency.	Not defined on 9/11/61 Problem deep rooted in probable retrofit required. Exact degree of deficiency not established.
5. Turbine Matching and Efficiency			Test results indicate turbine efficiency down 1.5 to 2% from calculated values.	Not defined on 9/11/61 Problem may require downstream retrofit for resolution.

Problem	References		Approved For Release	Contractor Confidence Relative to 9/11/61	Remarks/Action
	Report No.	Date			
C. Controls:					
Pratt & Whitney	OKC-1298	2/7/61			
1. Valve and Piston Seizures	OKC-1479,00	3/24/61			
	OKC-1572	4/27/61			
	OKC-1726,7	5/24/61			
	OKC-1823,4	6/19/61			
	OKC-1987	8/2/61			
	OKC-2040	8/3/61			
	OKC-2235	9/1/61			
	OKC-2341	9/26/61			
			Until controls are delivered and engine tested which incorporate 100% hardened surfaces, this problem will continue to exist. Very current engine tests indicate promise.	No change confirmed	Initial production units with 100% hardened surface scheduled for mid December delivery.
2. Speed Schedule Inconsistency	OKC-1479,80	3/24/61			
(a) Gears	OKC-1823	6/19/61			
(b) Erratic Starts	OKC-1987	8/2/61			
(c) Military Speed Hysteresis					
			Although improvements have been and continue to be made, because of the seizure problem engine test evaluation has been limited.	No change confirmed	Test evaluation to commence with the 100% hardened surface hardware.
3. Exhaust Nozzle Control Instability	OKC-1479	3/24/61			
	OKC-1987	8/2/61			
	OKC-2234,5	9/3/61			
			Very current engine testing has revealed improvement, however this is preliminary. More testing required to raise confidence.	No change confirmed	Initial production units scheduled for December delivery incorporate interim fix of increased damping. Final resolution hinges on redesign of four way pilot valve.
1,2,3 Same as above	OKC-1479,80	3/24/61			
	OKC-2477	10/19/61			
	OKC-2486	10/23/61			
	OKC-2545	10/23/61			
	OKC-2589	11/6/61			
	OKC-2636	11/25/61			
			Design efforts and bench testing indicate potential improvements.	Increased	Realistic evaluation depends on engine test.
4. Casting Quality	OKC-2751	12/4/61			
			Initial production hardware schedules suffer from quality of castings received during the summer 1961	Increased	Current casting deliveries show improved quality. Accelerated vendor coordination should eliminate problem for March 1962 finished control

Problem		References Name No. Date	CFR/CFR Problem Status	CFR Confidence Relative to 9/11/61	Remarks/Action
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B. Durability:					
1. Turbine Blades	OKC-1572	4/17/61	Although this problem implicitly covered under performance test change (B.1), extended blade life as dictated by corrosion at 1900° F is questionable.	No change	Continuous effort to reduce corrosion.
2. Compressor Rotor	OKC-1571,2 OKC-1574,7 OKC-1823,4 OKC-1926	4/17/61 5/22/61 6/19/61 7/25/61	Redesigned rotor incorporating belted rim dampers and improved quality discs now assembled into FX-114; being assembled into FX-115.	No change confirmed	Realistic increase in confidence hinges on test confirmation on FX-114 and 115 to be ready for test in December.
3. Turbine Rotor	OKC-1493 OKC-1724 OKC-1823 OKC-1926 OKC-2341	3/24/61 5/22/61 6/19/61 7/25/61 9/26/61	Rotor speed currently limited because of van alloy discs. Aust alloy discs will lift limitation.	No change	Initial sample of aust alloy discs target for 7 Y engine reveal improved quality. Inspection to date incomplete.
4. Compressor Air Seal Diaphragms	OKC-2709	11/21/61	50 hour tests on FX-112, 115 revealed design deficiency.	Not established on 9/11/61	Redesign underway.
5. Gears/Shafts	OKC-1823 OKC-1927 OKC-2709	6/19/61 8/2/61 11/24/61	50 hour test has revealed fair durability for the initial steel remote box. Increased airframe misalignment requirements were not tested. Titanium gearbox not tested to date.	Increased prior to new misalignment requirements.	Investigation underway for increased misalignment.
6. General Engine	OKC-2709	11/24/61	FX-115 50 hour test results fairly good. FX-112 50 hour test results not so good.	Some increase	Push more testing required to establish flight-worthiness.
7. Engine Out - Heat Rejection	OKC-0594-40	5/26/60	Possible engine seizure after flame out without adequate cooling.	Not applicable.	Problem deferred to flight test phase.